Citizen Explorer and BalloonSats Projects

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April 5, 2002

Presentation Outline

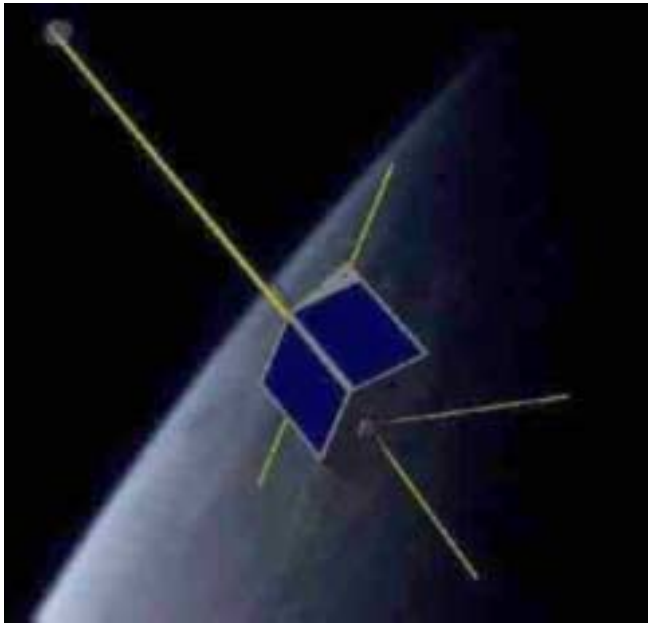
- Who's Involved?
- Citizen Explorer I Project
  - Concept Architecture
  - Brief Subsystem Overview
  - Educational Aspects
- BalloonSat Projects
- Benefits as a Student

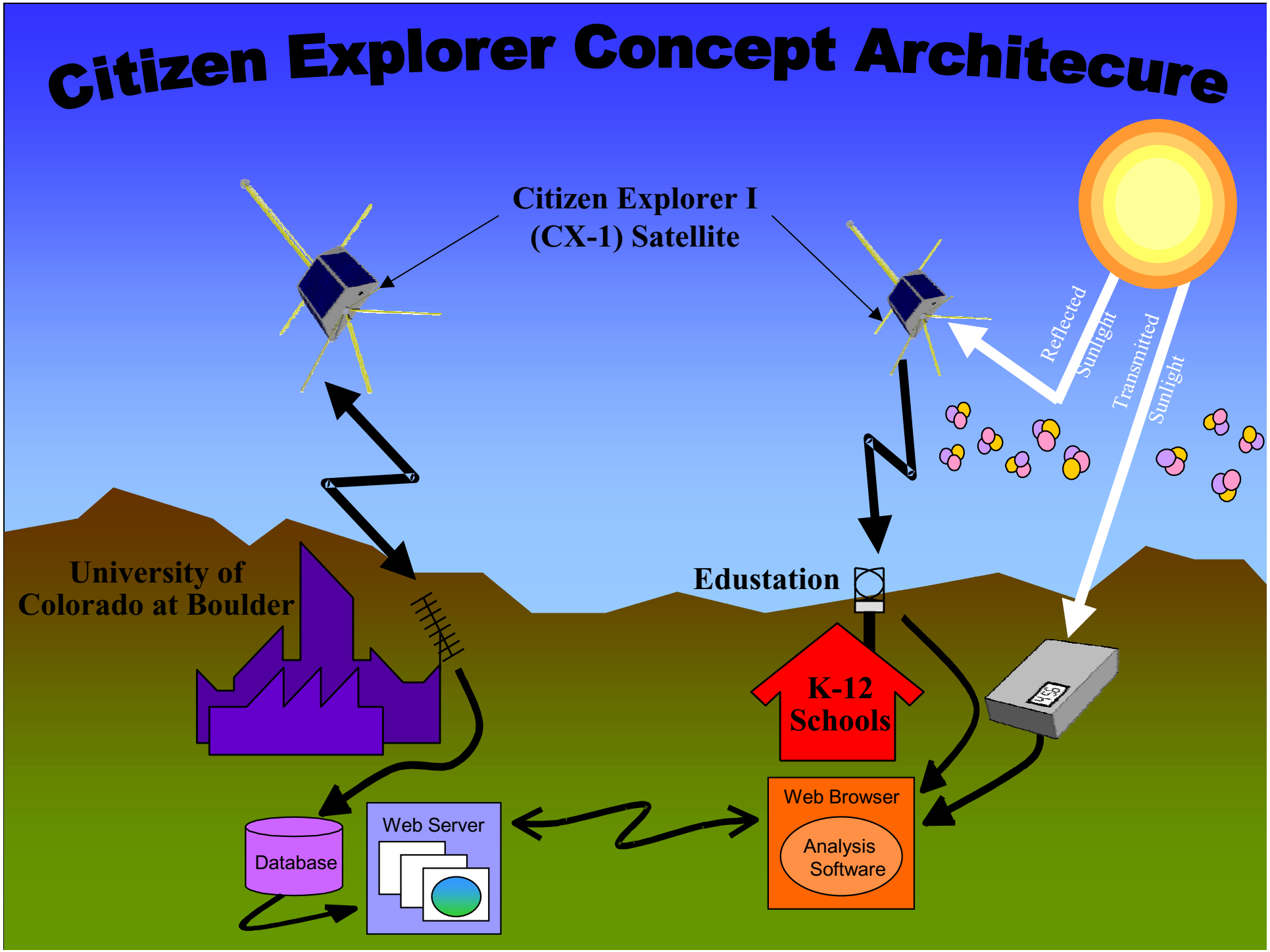
Who's Involved?

- All majors
- Undergraduate and Graduate Students
- International Students
- Students working for credit, pay and as volunteers

Citizen Explorer

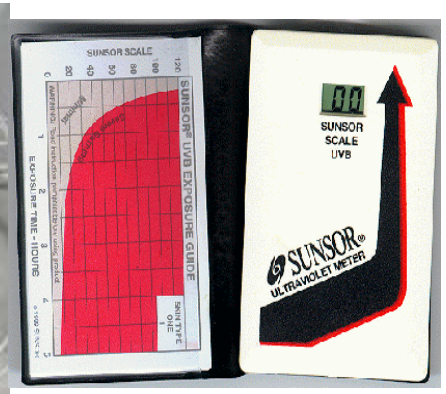
- Earth orbiter
- Measures ozone in the Earth's atmosphere
- Designed, built and controlled entirely by students

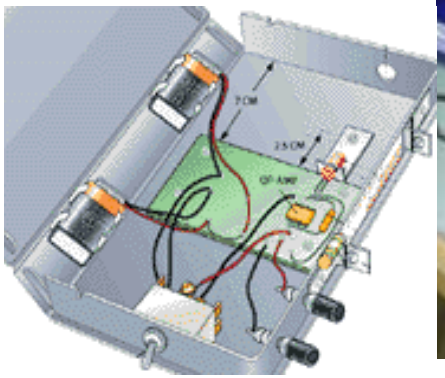



Citizen Explorer Concept Architecure
Citizen Explorer I
(CX-1) Satellite
Reflected
Sunlight
Transmitted
Sunlight
University of
Colorado at Boulder
Edustation
K-12
Schools
Web Server
Database
Web Browser
Analysis
Software

CX-I Overview

Science

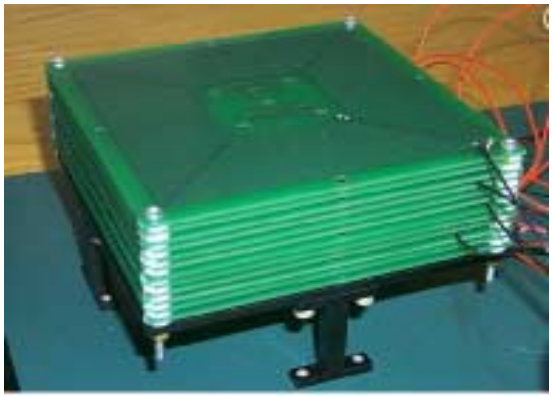




- Spectrophotometer
  - measurements of the backscattered UV-B irradiance from the Earth's atmosphere
- Photometer
  - measure the earth's surface reflectivity, known as albedo
- Handheld ground instruments
  - UV-B detector
  - Aerosol detector

Attitude Determination and Control

- Momentum Wheel-donated by Ball Aerospace
- Magnetic Coils
- Gravity Gradient Boom
- Coarse Sun Sensors
- Magnetometer

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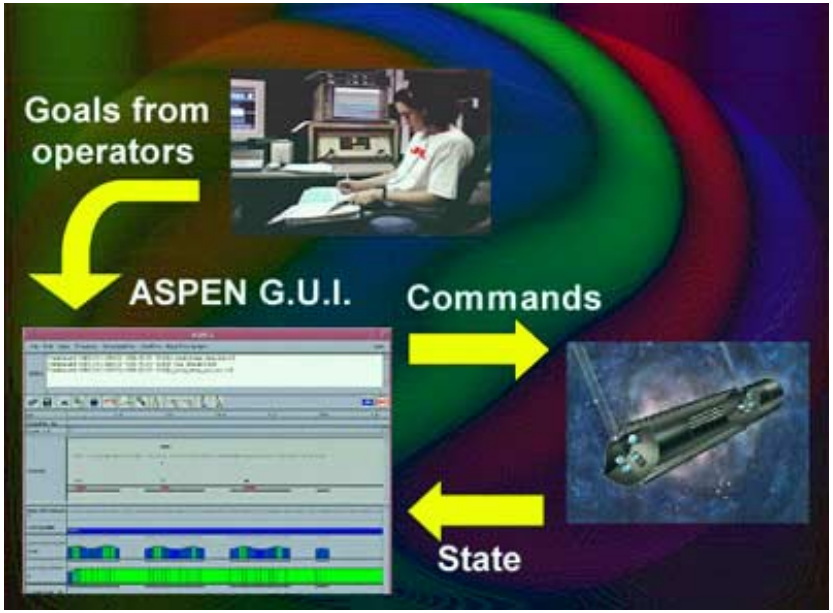
Power

- CX is powered by 24% efficient solar panels donated from SpectroLab
- Batteries store excess energy
- Peak Power Trackers (PPT)

Mission Operations



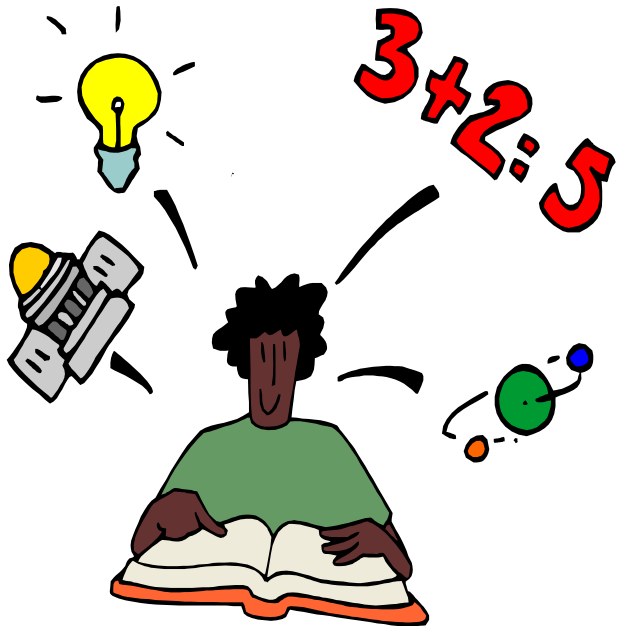
- Satellite Took Kit (STK), Spacecraft Command Language (SCL), Automated Planning and Scheduling Environment (ASPEN), Selective Monitoring Software (SELMON), and SAMMI
- Mission Operations center is at the University of Colorado at Boulder

Communication

- Terminal Node Controller (TNC) sending data
- Point to Point Protocol (PPP)
- AX-25 used for Edu-station communication

Citizen Explorer Educational Aspect

- Involves K-12 schools from around the world
  - Environmental and space education
  - Young students work closely with space age technology
  - Linking pre-college and college-age students



BalloonSats

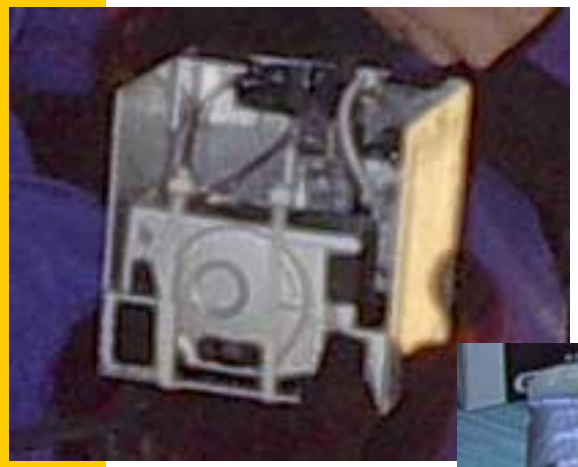
- Form groups of 10 students
- Given an RFP (Request for Proposal) with strict, specific guidelines
- Team responds with a proposal for an experiment
- Light weight experiment (500 grams or 1.1 lbs)
- Self contained within a 10 cm cubic structure
- Endure the elements
  - Impact: 20 – 30 mph
  - Temperature: -60 degrees Celsius
  - Ascent: 1000 ft/min

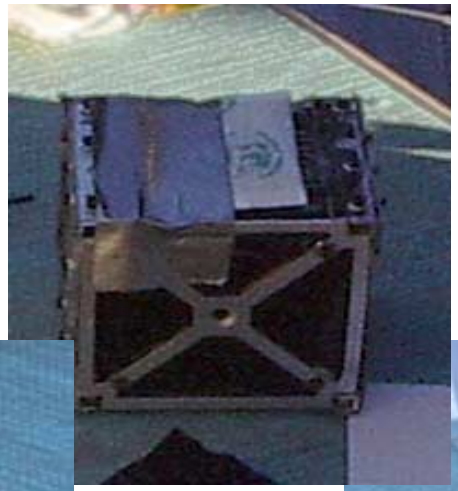
BalloonSat 1 – Fall 2000

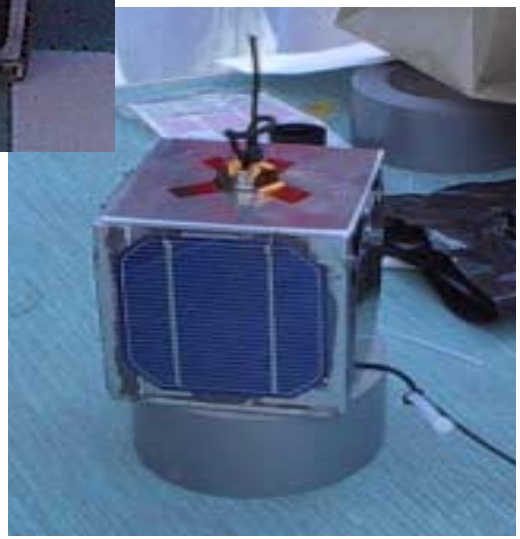
BalloonSat 1

- **11-19-00**
- **Windsor, CO**
- **4 BalloonSats**
- **EOSS-45**
- **90,573 feet**
- **Last Chance, CO**

BalloonSat 1 – Fall 2000



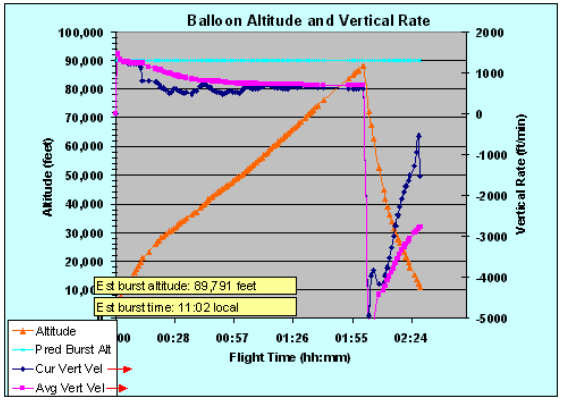




BalloonSat 2 – Spring 2001

BalloonSat 2

- 04-21-01
- Windsor, CO
- 4 BalloonSats
- EOSS-49
- 89,791 feet
- Kimble, NE



BalloonSat 3 – Summer 2001

BalloonSat 3

- **08-25-01**
- **Byers, CO**
- **3 BalloonSats**
- **EOSS-51**
- **92,328 feet**
- **Byers, CO**

BalloonSats Benefits

- Student teams can complete projects in less than one year
- BalloonSats teach students the basics of designing and developing a simple mission
- BalloonSats reach the edge of space and prepare students for the next step into a project at SG

Benefits as a Student

- Similar to industry
- Theory vs. Application
- Work with hardware that is actually going into space!
- Working relationships with other students, other majors
- Team work
- Connections to people in industry
  - Ball Aerospace
  - Lockheed Martin
  - Jet Propulsion Laboratory
  - NASA
- Contacts/Networking

Questions or Comments?

!Thank You!